Talking Cane

September 19, 2012

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Problem Statement:

Older adults that require the use of a cane for day to day motility can cause serious harm to themselves by forgetting to use their cane. The goal of this project is to design a cane that can notify the user when the user begins to walk away without it. In addition, the cane should provide useful feedback about the canes usage such as time, total steps taken and cadence. The technology would ideally be transferable to use with a walker.

Client Requirements:

- Cane must have a sensor that notifies the user when they walk away without it
- Cane needs to be able to measure time used, steps taken, and cadence
- Data from the cane must be transferable to care provider

Design Restraints:

1. **Physical and Operational Requirements**
    a. *Performance requirements:* The cane should be able to support user weight and should not inhibit normal mobility.
    b. *Safety:* The alarm on the cane should not startle the user causing unsafe behavior.
    c. *Accuracy and Reliability:* The cane should notify the user when they are 10 or more feet away from the cane. Step count, cadence and time of use data should be accurate within 5%.
    d. *Life in Service:* The device should last for lifetime of the patient with appropriate power supply.
    e. *Shelf life:* Shelf life is not an applicable restraint for the device.
    f. *Operating Environment:* The device will be used in a clinical study by a clinical research assistant. The device should be able to function in the home as well as outside.
    g. *Ergonomics:* The device should be comfortable for the user and not inhibit their normal. The device should be easy to read for low vision users, should have no small buttons, and should be easy to use for users with limited technological knowledge.
    h. *Weight:* The device weight should not add more than 2 lbs to the functional cane weight.
    i. *Materials:* The cane should be made out of standard materials such as aluminum, that can incorporate the appropriate electronic equipment.
    j. *Aesthetics, Appearance, and Finish:* The user sensor should be small and attachable to clothing or wrist. The incorporated electronics should be neatly packaged.

2. **Product Characteristics**
    a. *Quantity:* The client requires one working prototype to be tested by human subjects.
    b. *Target Product Cost:* $20-500, could be increased with client approval

3. **Miscellaneous**
    a. *Standards and Specifications:* The device should hold patient weight and be user friendly.
    b. *Customer:* The device will be tested on human subjects
    c. *Patient concerns:* The device should be user friendly for those with audio, visual, and precise movement impairments. The alarm should not cause additional agitation or unhealthy patient behavior.
    d. *Competition:* Currently there are devices on the market that incorporate step counting, time measurement, and cadence abilities. However there are no canes that are able to sense when the user walks away or have a feature that talks.